Endovascular Management of a Traumatic Basilar Tip Aneurysm following Endoscopic Ventriculostomy in a Child

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Summary

We report the case of four year nine month old girl that presented a basilar tip iatrogenic arterial aneurysm following ventriculostomy. Despite being a false aneurysm the lesion was successfully coiled two years later.

Introduction

Cerebral aneurysms are rare in childhood and, where the aetiology is known, are typically associated with trauma, or sepsis [1]. We present the management of a basilar tip pseudoaneurysm in a four year old girl following ventriculostomy two years previously.

Case history

This girl presented at the age of four months with obstructive hydrocephalus secondary to a posterior fossa cyst. A ventriculoperitoneal shunt was sited, but multiple shunt revisions were required until at the age of two years and nine months. Because of two emergency revisions within two days it was decided to perform an endoscopic third ventriculostomy.

This proved to be a difficult procedure because of the anatomy of the third ventricle that was distorted (figure 1), and multiple episodes of ventriculitis. The infundibulum and clivus could be identified, but no structure posterior to this could be distinguished, except for the mamillary bodies which were widely separated.

It was decided to perform the ventriculostomy on the floor of the third ventricle immediately posterior to the clivus, but during that surgery a iatrogenic arterial wound was created. Because of the severe subsequent intraventricular haemorrhage a drain was rapidly placed in the lateral ventricle. The child's vital signs remained stable with supportive management. MR examination one month later demonstrated a high signal structure at the basilar tip consistent with a pseudoaneurysm (figure 2). The ventriculoperitoneal shunt was reinserted, and the child made a complete recovery without any neurological deficit.

The pseudoaneurysm was managed conservatively by the referring team. Nevertheless two years later, a routine MR examination definitely demonstrated a basilar tip aneurysm, and the child was referred to our department for angiographic evaluation and possible endovascular therapy.

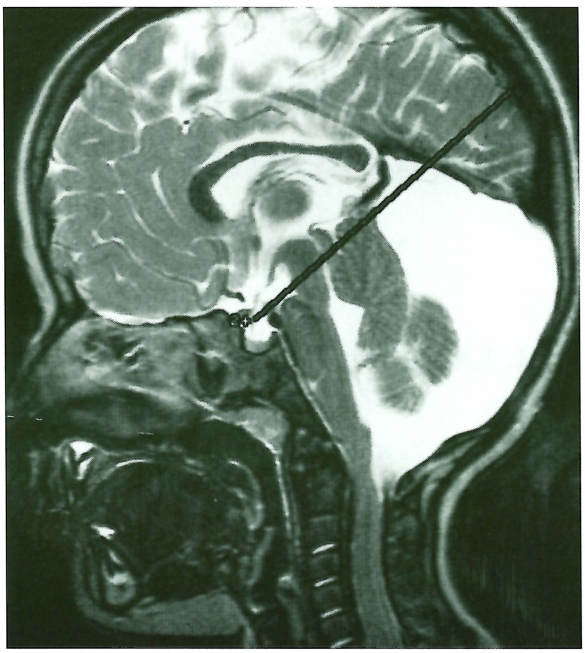

Figure 1 Sagittal T2W image following the vascular injury showing a posterior fossa cyst with associated effacement of the prepontine cistern and distorted third ventricular anatomy.

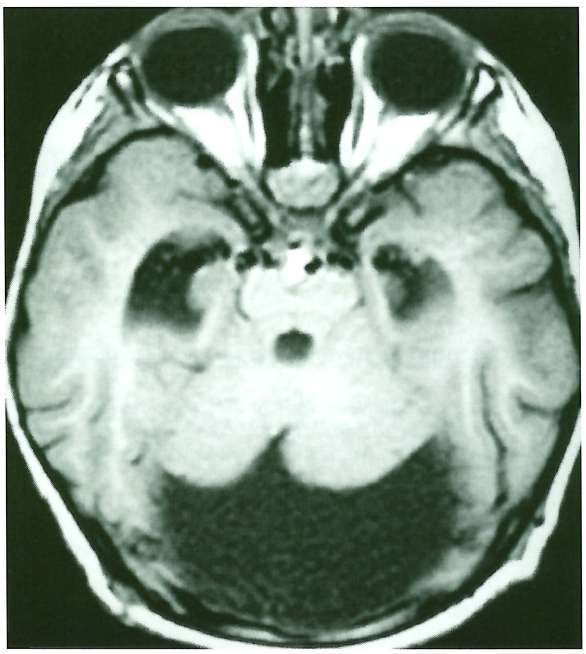

Figure 2 Axial T1W image showing a partially thrombosed basilar pseudoaneurysm.

A bilobed 8.6 by 4.4 mm basilar tip aneurysm was found at angiography (figure 3), and after discussion it was decided to treat the lesion with endovascular coiling. 43 cm of coils were detached within the aneurysm achieving a 90% occlusion with preservation of the P1 segments bilaterally (figure 4). At one year follow-up the child is clinically normal. The angiographic control and 3D reconstruction demonstrate complete exclusion of the aneurysmal sac (figure 5).

Discussion

Intracranial aneurysms are rare in children[1], and in the absence of trauma or sepsis their aetiology remains obscure. Childhood aneur-

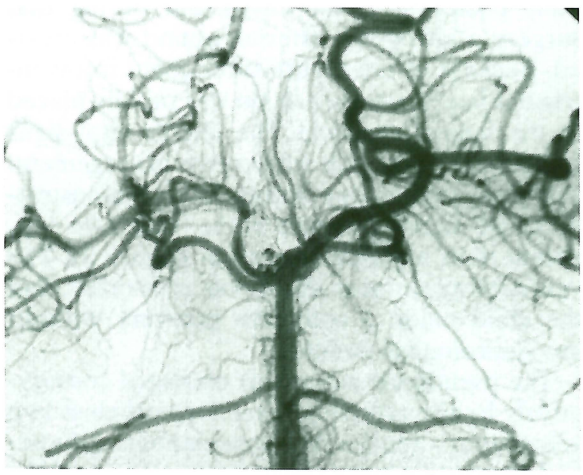

Figure 3 Vertebral angiogram showing a basilar tip aneurysm involving the right P1 segment (note the asymmetrical disposition with the bilateral diencephalic supply arising from the left P1 segment).

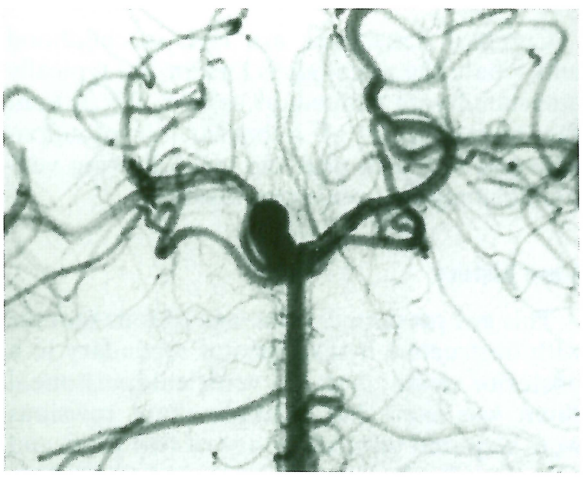

Figure 4 Vertebral angiogram post embolisation showing 90% occlusion of the lesion.

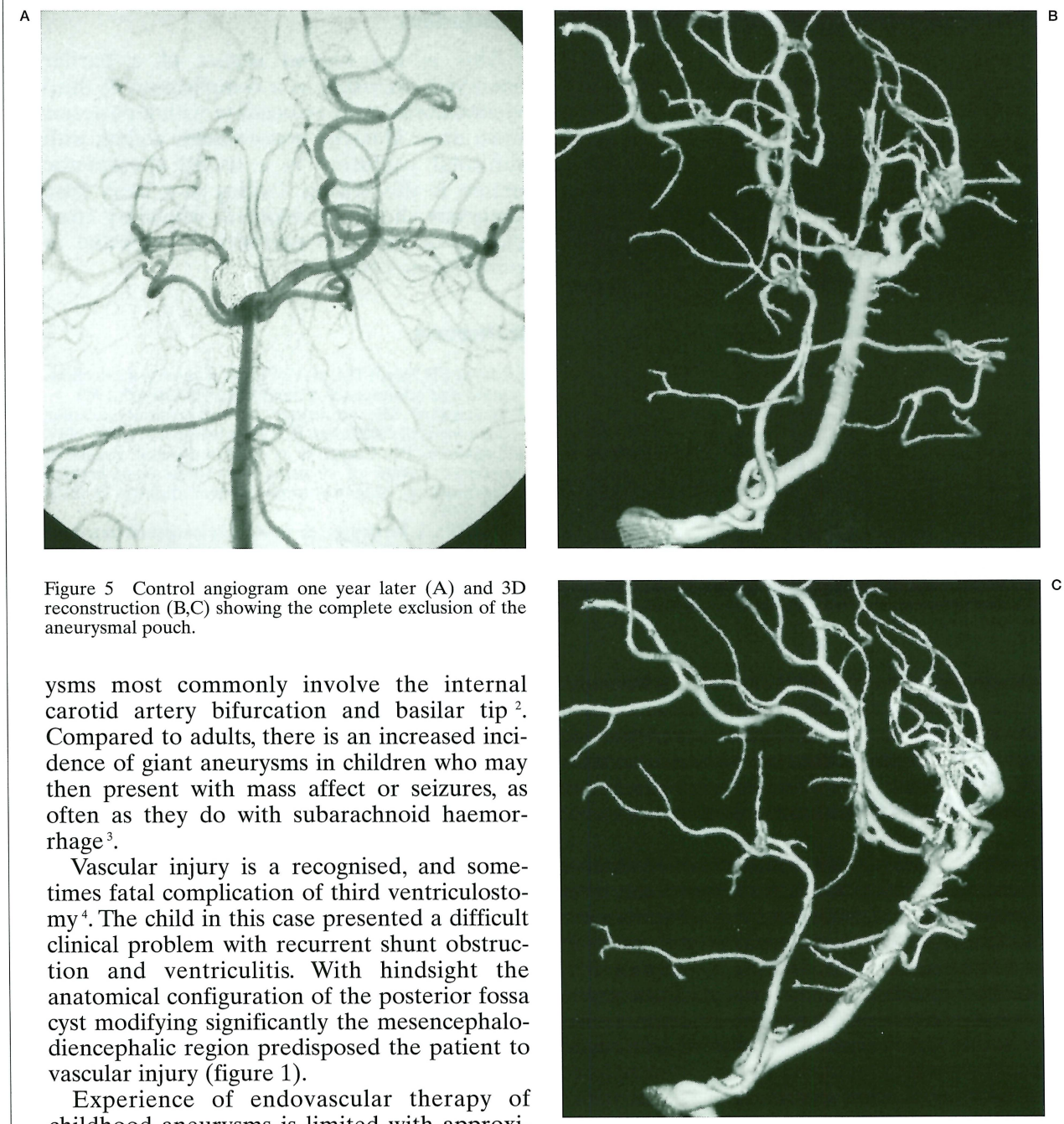

Figure 5 Control angiogram one year later (A) and 3D reconstruction (B,C) showing the complete exclusion of the aneurysmal pouch.

ysms most commonly involve the internal carotid artery bifurcation and basilar tip [2]. Compared to adults, there is an increased incidence of giant aneurysms in children who may then present with mass affect or seizures, as often as they do with subarachnoid haemorrhage [3].

Vascular injury is a recognised, and sometimes fatal complication of third ventriculostomy [4]. The child in this case presented a difficult clinical problem with recurrent shunt obstruction and ventriculitis. With hindsight the anatomical configuration of the posterior fossa cyst modifying significantly the mesencephalodiencephalic region predisposed the patient to vascular injury (figure 1).

Experience of endovascular therapy of childhood aneurysms is limited with approximately half of the cases being treated with parent vessel occlusion, and half with endosaccular coils [3,4].

Conservative management is appropriate in selected cases (particularly in mycotic aneurysms where spontaneous thrombosis and involution of the aneurysms may occur subsequently under well-conducted antibiotherapy.)

The hazards of endovascular coil embolisation of adult pseudoaneurysms in the acute phase are well recognised, regardless of their cause (trauma, aneurysm rupture, or AVM-related). Similar outcomes of endovascular therapy of acute pseudoaneurysms in children have also been noted [4,5].

Two iatrogenic aneurysms in a previous series [4] were treated with endovascular coils. One of these patients had a basilar aneurysm following third ventriculostomy for hydro-

cephalus secondary to a cerebellar astrocytoma. There was subsequent enlargement of a small post coiling residual lumen in both of these cases. The group concluded that such aneurysms should not be treated with endovascular coils. We certainly support this recommendation in the management of false aneurysms at the acute stage with currently avaliable tools.

Our case, however, raises a different problem, that is how to manage a trauma-related basilar tip aneurysm that has been asymptomatic and morphologically stable for two years; it was then considered similar to berry aneurysm. The natural history of such a lesion is unknown; there was little chance of the residual traumatic aneurysm disappearing with remodelling after two years. The child was considered at risk of subarachnoid haemorrhage. Because of this risk, exclusion of the lesion with endovascular coils was considered appropriate.

In view of the inherent risks of packing a pseudoaneurysm[5], endovascular remodelling of the distal basilar tip was considered dangerous and unnecessary.

A sub-total occlusion was planned to minimise the risks to the child, the coils were sited achieving a 90% occlusion of the lesion without complication. Secondary occlusion of the sac was subsequently noted.

Conclusions

This is the second report of a basilar aneurysm occurring as a complication of third ventriculostomy in association with a posterior fossa mass. Delayed endovascular coiling with sub-total occlusion is a useful therapeutic option in this setting. Coiling of a fresh false aneurysm should be avoided; secondary completion of sub-total exclusion is expected in ruptured aneurysm.

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